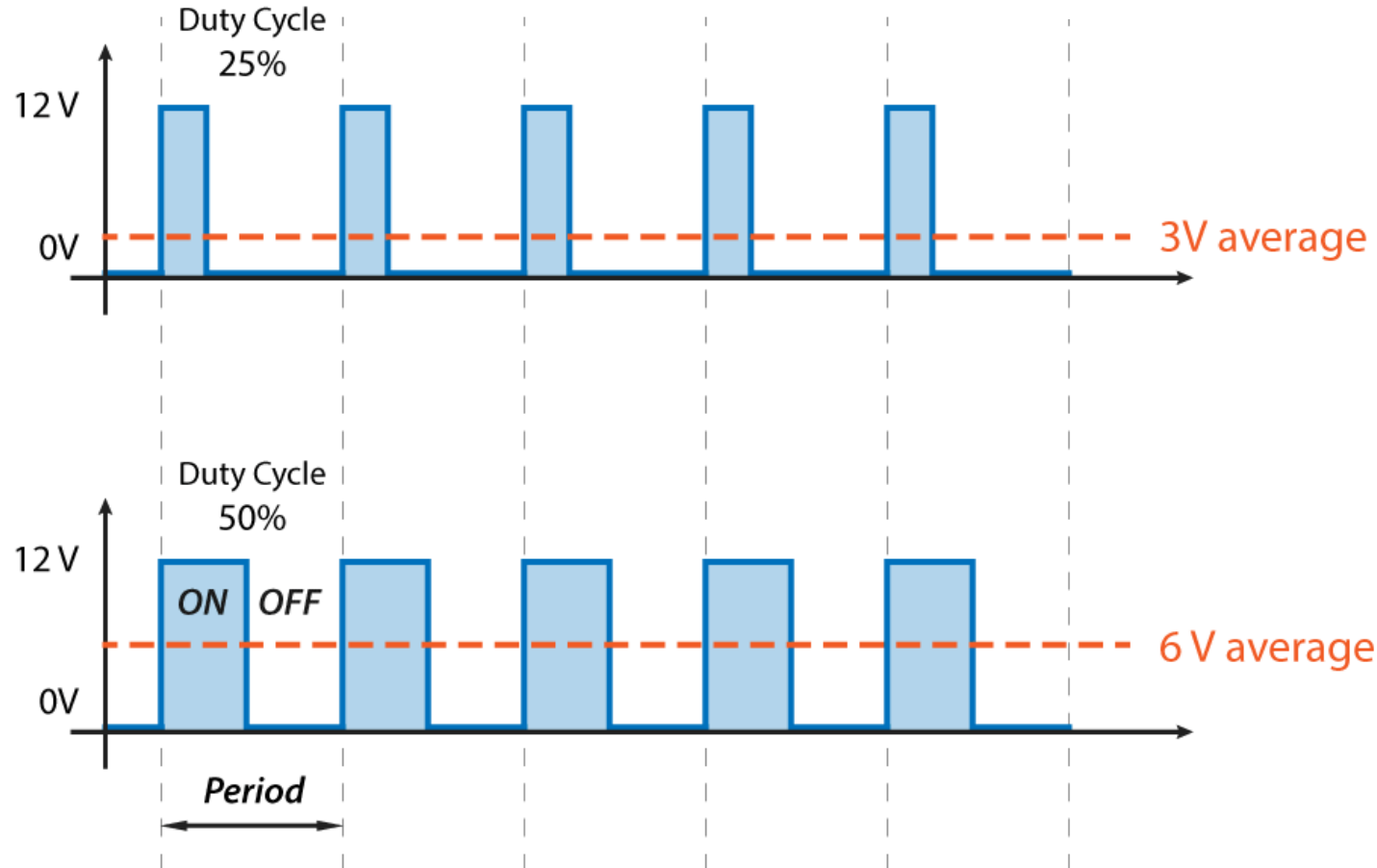


Input/Output  
<PWM - Input>

# What is PWM?

## Pulse Width Modulation



# Making PWM Pin (Analog Output)

PB.5 → Arduino Uno pin 13

```
int i=0;

while(1){
  while (i<=15000) {

    PORTB=0b00100000;
    _delay_ms(0.01);
    PORTB=0b00000000;
    _delay_ms(0.09);
    i++;
  }
  i=0;
```

# Making PWM Pin (Analog Output)

PB.5 → Arduino Uno pin 13

```
int i=0;
```

```
while(1){  
  while (i<=15000) {
```

```
    PORTB=0b00100000;
```

```
    _delay_ms(0.01);
```

```
    PORTB=0b00000000;
```

```
    _delay_ms(0.09);
```

```
    i++;
```

```
  }
```

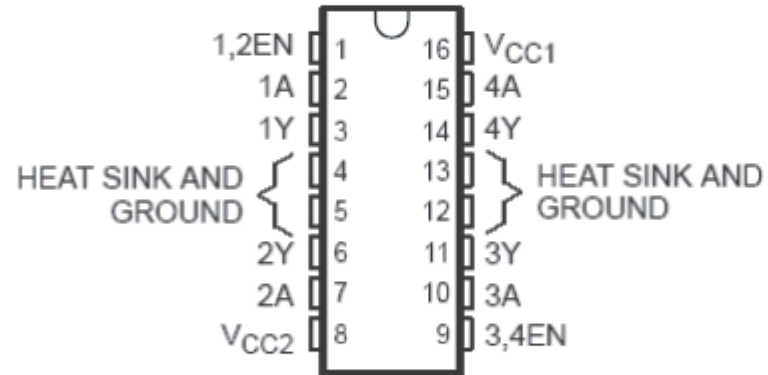
```
  i=0;
```

Approximately more than 1.5 seconds



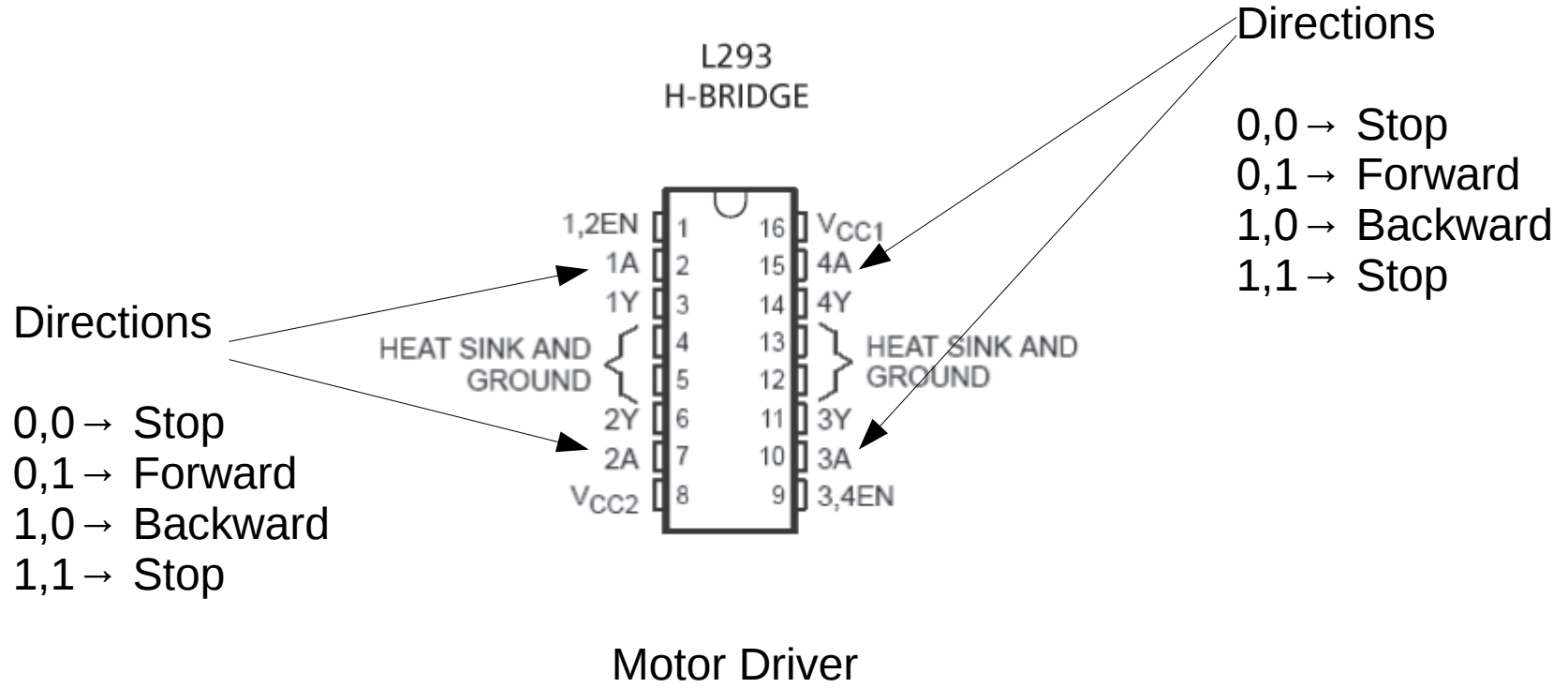
# Motor Control

L293  
H-BRIDGE

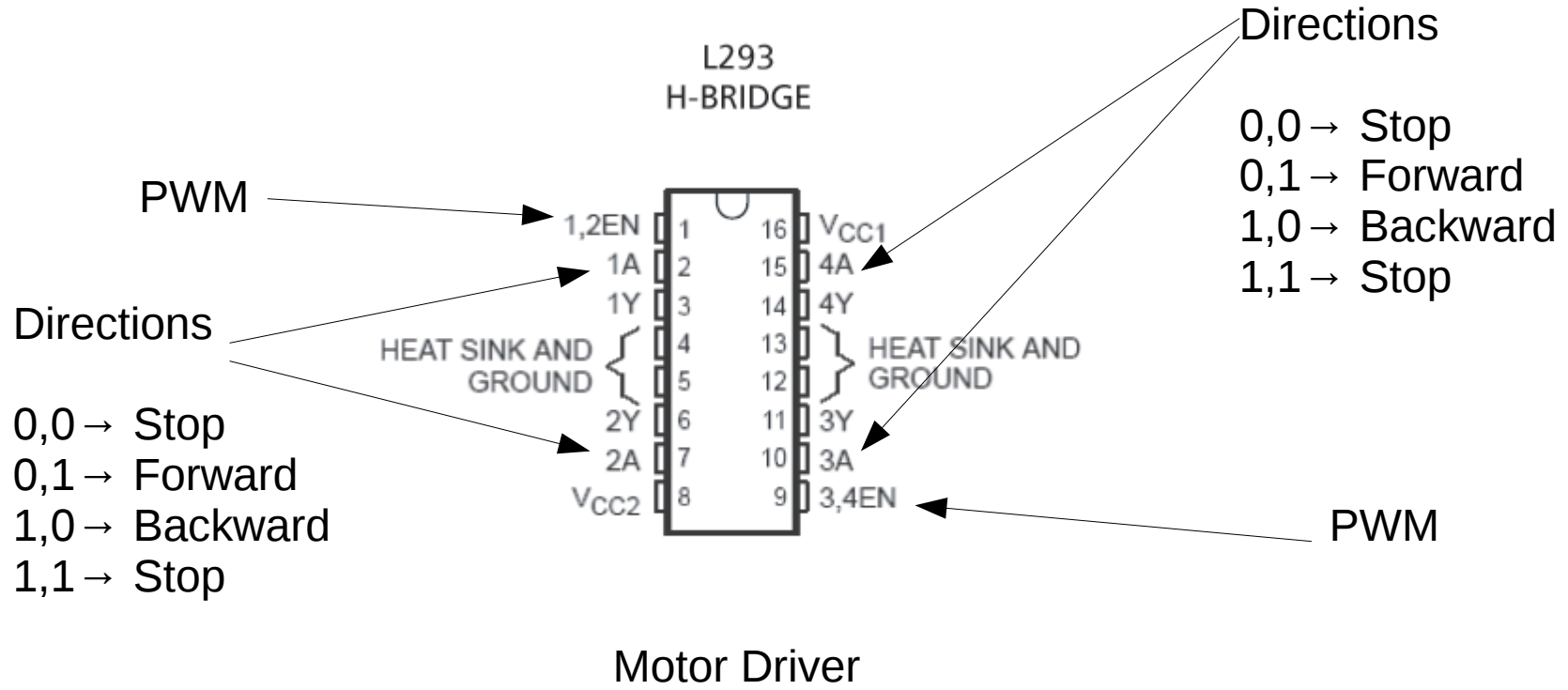


Motor Driver

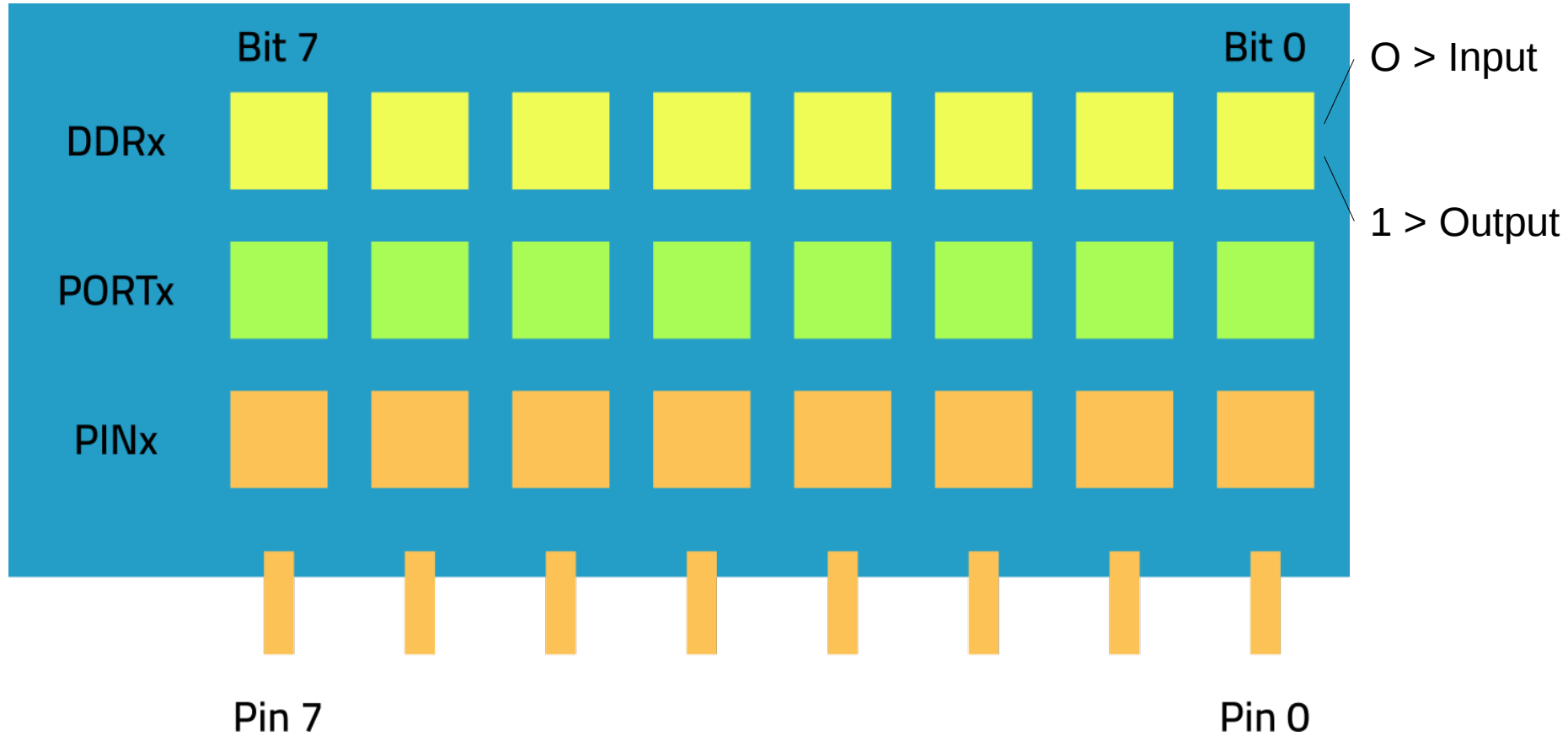
# Motor Control



# Motor Control

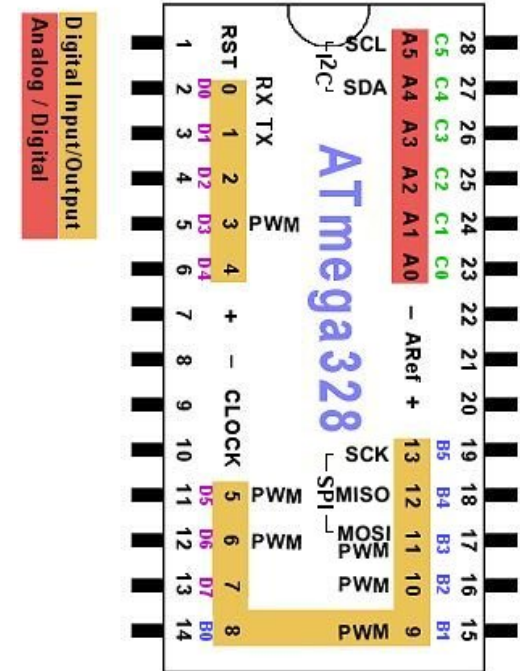
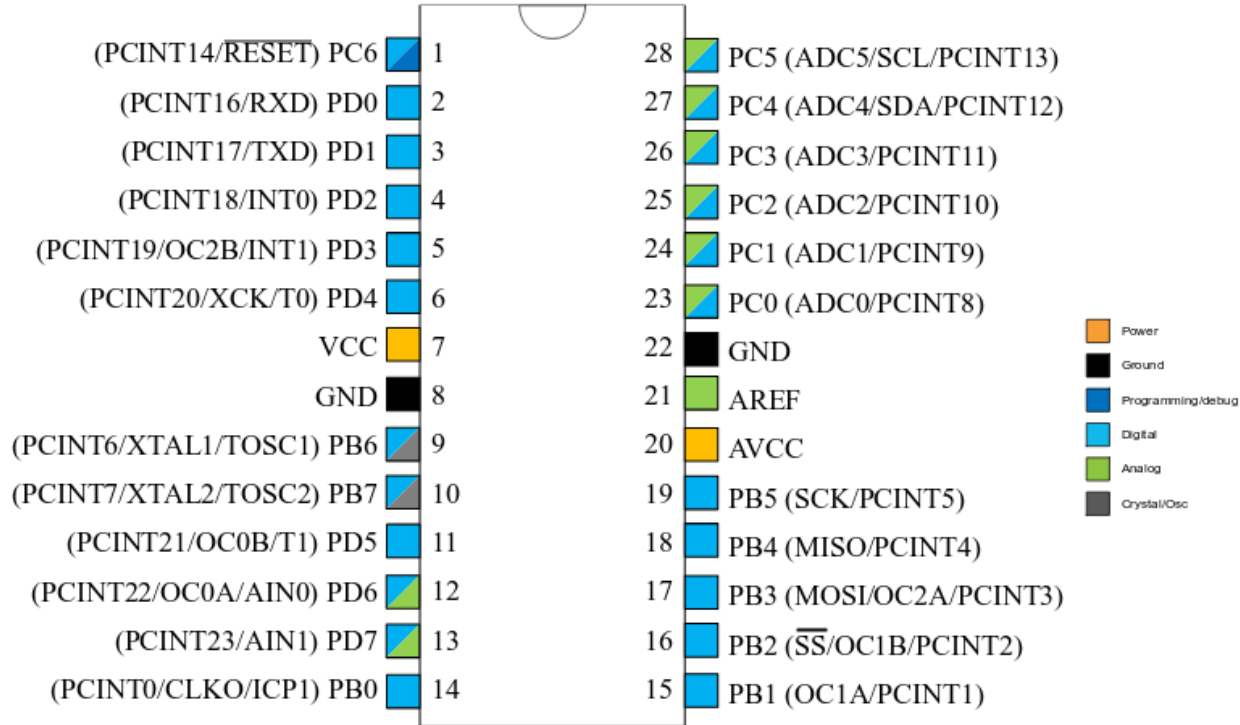


# DDR – PORT - PIN





# Map between MCU and Arduino



# Switch Input

```
#include <avr/io.h>
```

```
int main() {
```

```
    DDRC=0b00000000;
```

```
    DDRB=0b00100000;
```

```
    while(1) {
```

```
        if ((PINC & 0b00000100)==0b00000100) {PORTB=0b00100000;}
```

```
        if ((PINC & 0b00000100)==0b00000000) {PORTB=0b00000000;}
```

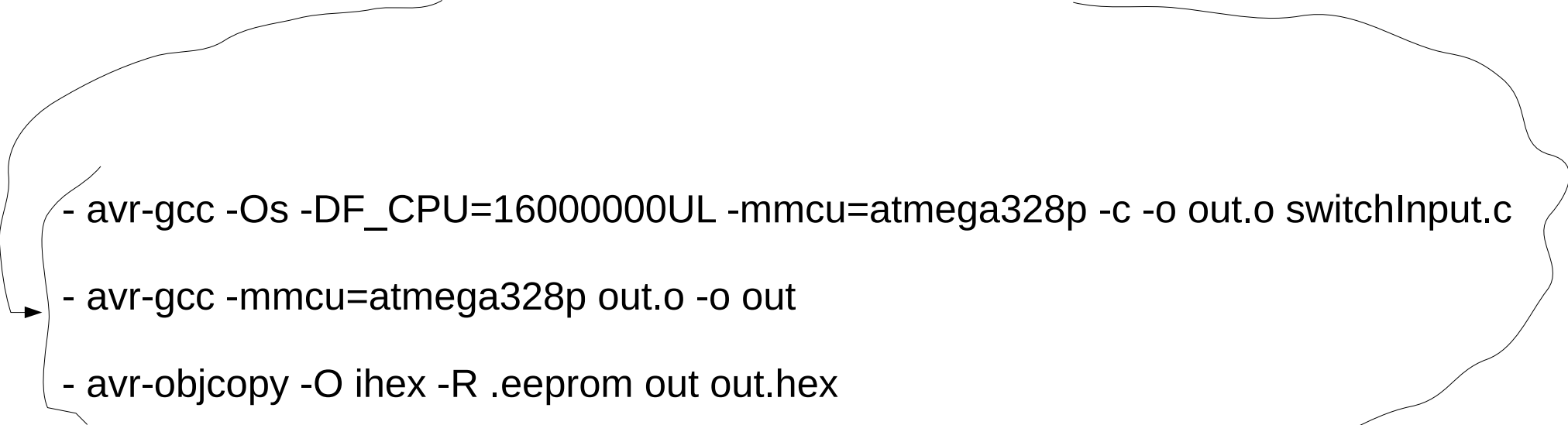
```
    }
```

```
}
```

# Build (Compile) and Burn

- `avr-gcc -Os -DF_CPU=16000000UL -mmcu=atmega328p -c -o out.o switchInput.c`
- `avr-gcc -mmcu=atmega328p out.o -o out`
- `avr-objcopy -O ihex -R .eeprom out out.hex`
- `avrdude -F -V -c arduino -p ATMEGA328P -P COM* -b 115200 -U flash:w:out.hex`

# Build (Compile) and Burn

- 
- `avr-gcc -Os -DF_CPU=16000000UL -mmcu=atmega328p -c -o out.o switchInput.c`
  - `avr-gcc -mmcu=atmega328p out.o -o out`
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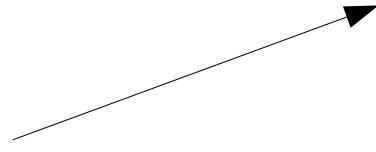
# Switch Input

```
(PINC & 0b00000100)==0b00000100  
(PINC & 0b00000100)==0b00000000
```

# Switch Input

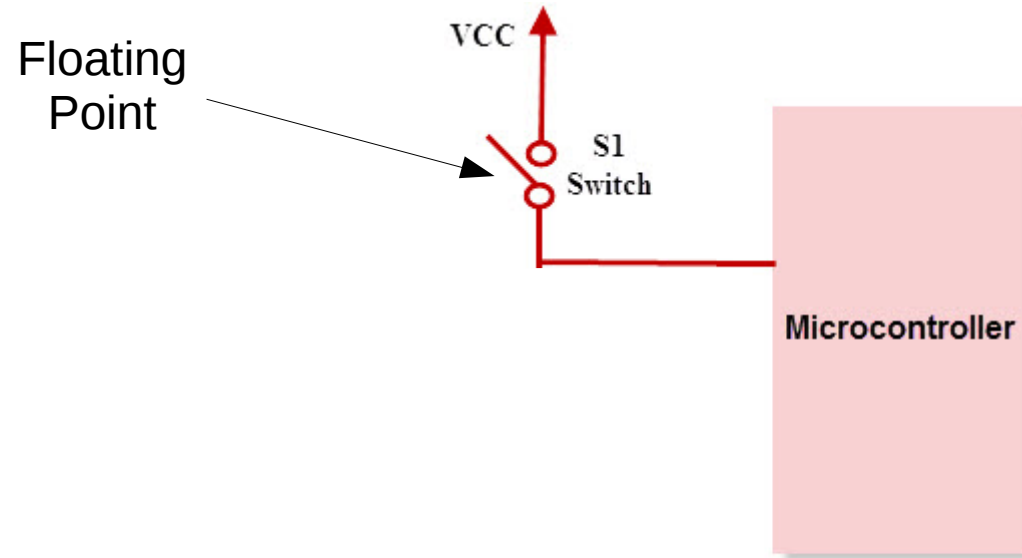
(PINC & 0b00000100)==0b00000100  
(PINC & 0b00000100)==0b00000000

Mask

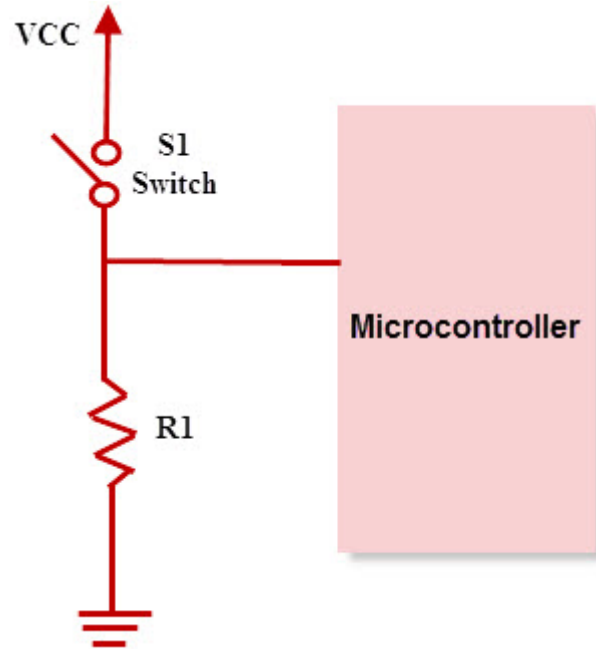


Masking

# Pull Down Resistor

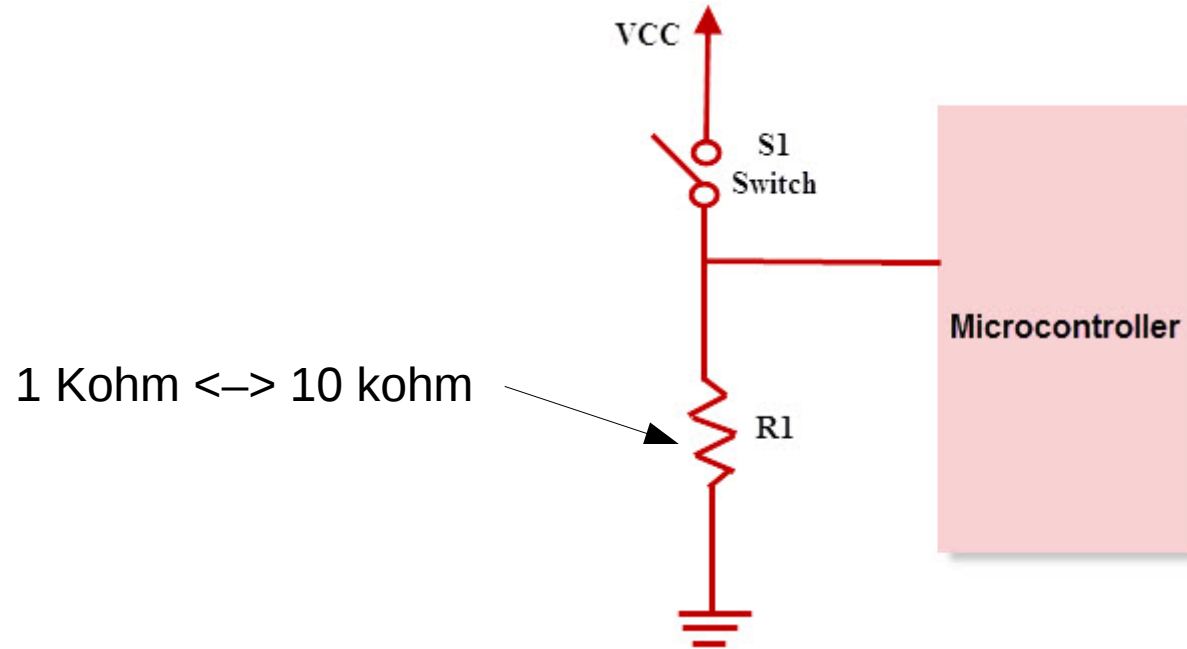


# Pull Down Resistor



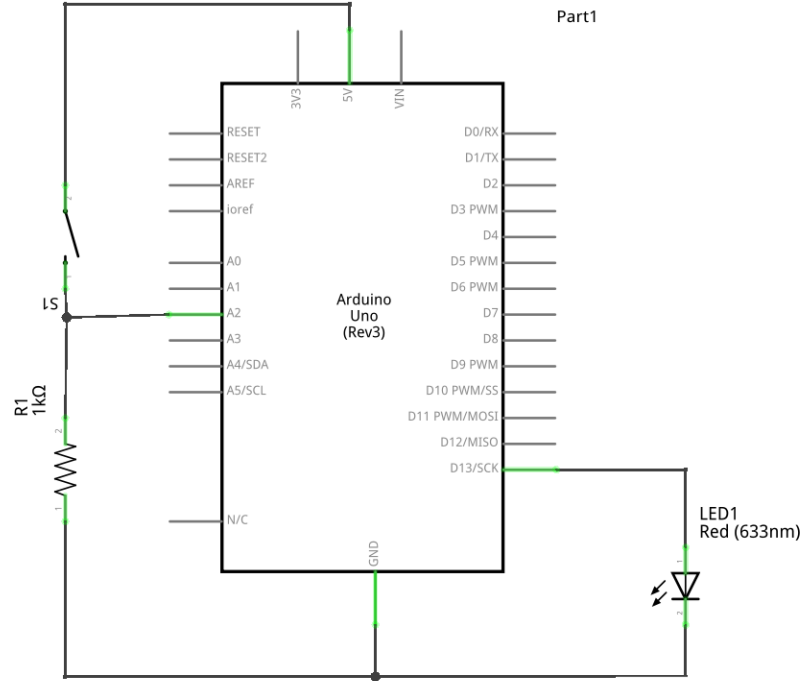


# Pull Down Resistor

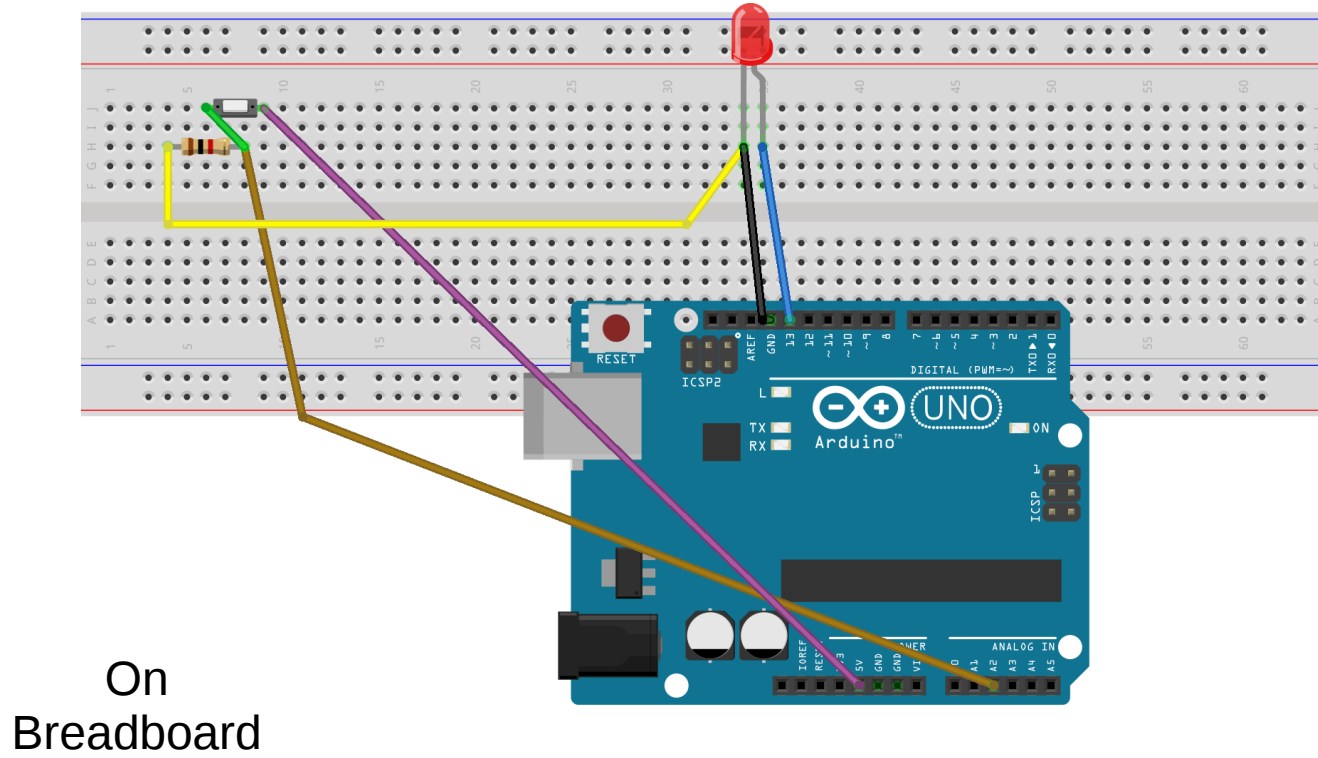


# The connections

Schematic  
Connections



# The connections



Thanks